

ABSTRACT

[0135] The methods, apparatus and compositions disclosed herein concern the detection, identification and/or sequencing of biomolecules, such as nucleic acids or proteins. In certain embodiments of the invention, coded probes comprising a probe molecule attached to one or more nano-barcodes may be allowed to bind to one or more target molecules. After binding and separation from unbound coded probes, the bound coded probes may be aligned on a surface and analyzed by scanning probe microscopy. The nano-barcodes may be any molecule or complex that is distinguishable by SPM, such as carbon nanotubes, fullerenes, submicrometer metallic barcodes, nanoparticles or quantum dots. Where the probes are oligonucleotides, adjacent coded probes hybridized to a target nucleic acid may be ligated together before alignment and SPM analysis. Compositions comprising coded probes are also disclosed herein. Systems for biomolecule analysis may comprise an SPM instrument and at least one coded probe attached to a surface.